WHAT IS CLAIMED IS:

1. A method for lung volume reduction, said method comprising:
isolating a lung tissue segment;
reducing gas flow obstructions within the segment; and
aspirating the segment to cause the segment to at least partially collapse.

2. A method as in claim 1, wherein reducing gas flow obstructions comprises inflating the lung tissue segment to a pressure higher than its normal inflated pressure.

3. A method as in claim 2, further comprising deflating adjacent lung regions while the lung tissue segment is inflated.

4. A method as in claim 2, wherein inflating the lung tissue segment comprises positioning a catheter in an air passage leading into the segment, inflating a balloon on the catheter to seal the air passage, and introducing a gas through the catheter to inflate the segment.

5. A method as in claim 1, wherein reducing gas flow obstructions comprises introducing an agent to the lung tissue segment, wherein the agent clears or dilates air passages within the segment.

6. A method as in claim 5, wherein the agent is selected from the group consisting of mucolytic agents, bronchodilators, surfactants, desiccants, solvents, necrosing agents, perfluorocarbons, and absorbents.

7. A method as in claim 5, wherein introducing the agent comprises positioning a catheter in an air passage leading to the segment and delivering the agent through the catheter to the segment.

8. A method as in claim 1, wherein reducing gas flow obstructions comprises delivering mechanical energy to the lung segment.

9. A method as in claim 8, wherein the mechanical energy is vibrational energy.

10. A method as in claim 8, wherein the vibrational energy is delivered by inflating the segment with a non-compressible fluid and ultrasonically exciting the fluid to distribute ultrasonic energy throughout the segment.

11. A method as in claim 1, wherein isolating the lung tissue segment comprises positioning a catheter in an air passage leading to the lung tissue segment and inflating a balloon on the catheter to occlude the air passage.

12. A method as in claim 11, wherein aspirating comprises drawing gas and liquids present from the isolated lung segment through a lumen in the catheter while the balloon remains inflated.

13. A method as in claim 12, wherein aspirating is performed at a negative pressure in the range from 2 mmHg to 50 mmHg.

14. A method as in claim 1, further comprising sealing an air passage which opens to the lung tissue segment to inhibit reinflation of the segment.

15. A method as in claim 14, wherein sealing comprises deploying a plug in the air passage.

16. A method as in claim 15, wherein the plug is swellable and absorbs water to swell within the air passage when deployed.

17. A method as in claim 16, wherein the plug comprises a collagen hydrogel which is not fully hydrated prior to deployment.

18. A method as in claim 14, wherein sealing comprises introducing a plug and an adhesive in the air passage.

19. A method as in claim 18, wherein the adhesive includes a radiopaque tracer.

20. A method for lung volume reduction, said method comprising:
isolating a lung tissue segment;
aspirating the isolated segment to cause the segment to collapse; and
applying external pressure to the isolated segment.

21. A method as in claim 20, wherein external pressure is applied by insufflating a pleural space over the lung.

22. A method as in claim 21, wherein the pleural space is insufflated with a percutaneously placed needle.

23. A method as in claim 20, wherein external pressure is applied by inflating a balloon in a pleural space over the lung.

24. A method as in claim 20, wherein external pressure is applied by engaging a percutaneously placed probe against an external surface of the lung.

25. A method as in claim 20, wherein isolating the lung tissue segment comprises positioning a catheter in an air passage leading to the lung tissue segment and inflating a balloon on the catheter to occlude the air passage.

26. A method as in claim 25, wherein aspirating comprises drawing gases and liquids present from the isolated lung segment through a lumen in the catheter while the balloon remains inflated.

27. A method as in claim 20, further comprising sealing an air passage which opens to the lung tissue segment to inhibit reinflation of the segment.

28. A method as in claim 27, wherein sealing comprises deploying a plug in the air passage.

29. A method as in claim 28, wherein the plug is swellable and absorbs water to swell within the air passage when deployed.

30. A method as in claim 29, wherein the plug comprises a collagen hydrogel which is not fully hydrated prior to deployment.

31. A method for lung volume reduction, said method comprising:
isolating a lung tissue segment; and
determining a disease-related parameter within the isolated segment.

32. A method as in claim 31, further comprising:

aspirating the isolated segment to cause collapse if it is determined that the segment is diseased.

33. A method as in claim 32, wherein isolating the lung tissue segment comprises positioning a catheter in an air passage leading to the lung tissue segment and inflating a balloon on the catheter to occlude the air passage.

34. A method as in claim 33, wherein aspirating comprises drawing gases and liquids present from the isolated lung segment through a lumen in the catheter while the balloon remains inflated.

35. A method as in claim 31, further comprising sealing a lung passage leading to the isolated segment if it is determined that the segment is diseased.

36. A method as in claim 35, wherein the sealing step is reversible.

37. A method as in claim 31, wherein determining a disease-related parameter comprises measuring air flow into the lung tissue segment.

38. A method as in claim 31, wherein determining a disease-related parameter comprises measuring carbon dioxide concentration in the lung tissue segment.

39. A method as in claim 31, wherein determining a disease-related parameter comprises measuring forced expiratory volume of the lung tissue segment.

40. A method as in claim 31, wherein determining a disease-related parameter comprises measuring pressure within the lung tissue segment.

41. A method as in claim 31, wherein determining a disease-related parameter comprises measuring volume using a gas dilution method.

42. A method as in claim 31, wherein determining a disease-related parameter comprises measuring the compliance or pressure/volume curve of a lung tissue segment.

43. A method as in claim 31, further comprising sealing an air passage which opens to the lung tissue segment to inhibit reinflation of the segment.

44. A method as in claim 43, wherein the sealing step is reversible.

45. A method as in claim 43, wherein sealing comprises deploying a plug in the air passage.

46. A method as in claim 45, wherein the plug is swellable and absorbs water to swell within the air passage when deployed.

47. A method as in claim 46, wherein the plug comprises a collagen hydrogel which is not fully hydrated prior to deployment.

48. A method for lung volume reduction, said method comprising:

isolating a lung tissue segment;

aspirating the isolated segment to cause the segment to collapse, wherein the segment is collapsed to a volume which is no greater than 40% of the inflated size prior to aspiration.

49. A method as in claim 48, further comprising insufflating the isolated lung tissue segment with substantially pure oxygen to promote absorption atelectasis prior to aspirating.

50. A method as in claim 48, wherein isolating the lung tissue segment comprises positioning a catheter in an air passage leading to the lung tissue segment and inflating a balloon on the catheter to occlude the air passage.

51. A method as in claim 50, wherein aspirating comprises drawing gases and liquids present from the isolated lung segment through a lumen in the catheter while the balloon remains inflated.

52. A method as in claim 48, further comprising sealing an air passage which opens to the lung tissue segment to inhibit reinflation of the segment.

53. A method as in claim 52, wherein sealing comprises deploying a plug in the air passage.

54. A method as in claim 53, wherein the plug is swellable and absorbs water to swell within the air passage when deployed.

55. A method as in claim 54, wherein the plug comprises a collagen hydrogel which is not fully hydrated prior to deployment.

56. A system for performing intraluminal lung volume reduction, said kit comprising:

an isolation/access catheter having a proximal end, a distal end, an occlusion element near the distal end, and at least one lumen extending therethrough;

a sealing catheter having a proximal end, a distal end, and

a closure element carried by the sealing catheter;

wherein the sealing catheter may be introduced through the lumen of the isolation/access catheter and the closure element may be deployed from the sealing catheter.

57. A system as in claim 56, wherein the closure element comprises a swellable plug.

58. A system as in claim 56, wherein the isolation/access catheter includes at least two lumens extending therethrough.

59. A system as in claim 58, wherein the isolation/access catheter further including a fiber optic scope and a light source disposed to permit forward viewing.

60. A system for performing intraluminal lung volume reduction, said kit comprising:

an isolation/access catheter having a proximal end, a distal end, an occlusion element near the distal end, and at least one lumen extending therethrough; and

a reagent capable of being introduced to the lung through the isolation/access catheter lumen, wherein said reagent will clear or widen air passages within the lung.

61. A system as in claim 60, wherein the reagent is selected from the group consisting of mucolytic agents, bronchodilators, surfactants, desiccants, solvents, necrosing agents, perfluorocarbons, and absorbents.

62. A system as in claim 60, wherein the isolation/access catheter includes at least two lumens extending therethrough.

63. A system as in claim 62, wherein the isolation/access catheter further includes a fiber optic scope and a light source disposed to permit forward viewing.

64. A system for performing intraluminal lung volume reduction, said kit comprising:

an isolation/access catheter having a proximal end, a distal end, an occlusion element near the distal end, and at least one lumen extending therethrough; and

a probe which can be percutaneously introduced into a pleural region over the lung, said probe being capable of applying external pressure to the lung.

65. A system as in claim 64, wherein the probe has an inflatable balloon which engages a surface of the lung.

66. A system as in claim 64, wherein the probe has a non-inflatable atraumatic end which engages a surface of the lung.

67. A system as in claim 64, wherein the isolation/access catheter includes at least two lumens extending therethrough.

68. A system as in claim 67, wherein the isolation/access catheter further includes a fiber optic scope and a light source disposed to permit forward viewing.

69. A kit comprising:

an isolation/access catheter capable of being introduced transtracheally into the air passages of the lungs; and

instructions to introduce the isolation/access catheter to a target region of the lungs and to aspirate an isolated tissue segment according to claim 1.

70. A kit as in claim 69, further comprising a sealing catheter, wherein said instructions further set forth that an air passage leading to the isolated tissue segment is to be sealed using the sealing catheter after the region has been aspirated.

71. A kit as in claim 69, further comprising means for applying external pressure to the lung at the same time the lung is being aspirated.

72. A kit as in claim 69, further comprising an agent which clears or widens air passages in the lungs when introduced into the lungs prior to aspiration.

73. A kit as in claim 72, wherein the agent is selected from the group consisting of mucolytic agents, bronchodilators, surfactants, desiccants, solvents, necrosing agents, perfluorocarbons, and absorbents.

74. A kit comprising:

an isolation/access catheter capable of being introduced transtracheally into the air passages of the lungs; and

instructions to introduce the isolation/access catheter to a target region of the lungs and to aspirate an isolated tissue segment according to claim 20.

75. A kit as in claim 74, further comprising a sealing catheter, wherein said instructions further set forth that an air passage leading to the isolated tissue segment is to be sealed using the sealing catheter after the region has been aspirated.

76. A kit as in claim 74, further comprising means for applying external pressure to the lung at the same time the lung is being aspirated.

77. A kit comprising:

an isolation/access catheter capable of being introduced transtracheally into the air passages of the lungs; and

instructions to introduce the isolation/access catheter to a target region of the lungs and to aspirate an isolated tissue segment according to claim 31.

78. A kit as in claim 77, further comprising a sealing catheter, wherein said instructions further set forth that an air passage leading to the isolated tissue segment is to be sealed using the sealing catheter after the region has been aspirated.

79. A kit as in claim 77, further comprising means for applying external pressure to the lung at the same time the lung is being aspirated.

80. A kit as in claim 77, further comprising an agent which clears or widens air passages in the lungs when introduced into the lungs prior to aspiration.

81. A kit as in claim 80, wherein the agent is selected from the group consisting of mucolytic agents, bronchodilators, surfactants, desiccants, solvents, necrosing agents, perfluorocarbons, and absorbents.

82. A kit comprising:.

an isolation/access catheter capable of being introduced transtracheally into the air passages of the lungs; and

instructions to introduce the isolation/access catheter to a target region of the lungs and to aspirate an isolated tissue segment according to claim 48.

83. A kit as in claim 82, further comprising a sealing catheter, wherein said instructions further set forth that an air passage leading to the isolated tissue segment is to be sealed using the sealing catheter after the region has been aspirated.

84. A kit as in claim 82, further comprising means for applying external pressure to the lung at the same time the lung is being aspirated.

85. A kit as in claim 82, further comprising an agent which clears or widens air passages in the lungs when introduced into the lungs prior to aspiration.

86. A kit as in claim 85, wherein the agent is selected from the group consisting of mucolytic agents, bronchodilators, surfactants, desiccants, perfluorocarbons, and solvents.

87. A method for evacuating air from a region of a lung, said method comprising:

introducing a low molecular weight gas to a region, wherein the region collapses as the low molecular weight gas is absorbed into the blood stream.

88. A method as in claim 87, wherein the low molecular weight gas is helium.

89. A method as in claim 88, wherein the helium is present in a mixture with oxygen.

90. A method for lung volume reduction, said method comprising:

isolating a lung tissue segment;

determining a disease-related parameter within the isolated segment;

aspirating the segment to cause the segment to at least partially collapse; and

temporarily sealing a lung passage leading to the isolated segment.